



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

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Project Title Breaking the Double Helix: Effects of Solar UV Radiation on Super-coiled DNA	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to determine if solar radiation levels are high enough to damage healthy DNA. Specifically I tested to see whether a super-coiled plasmid (pUC19) would nick or break under the UV radiation in Kenya. In Kenya during the austral summer the UV radiation levels are high, so one can expect that there is also a higher percentage of damage done to the DNA in cell directly exposed to the solar radiation.</p> <p>Methods/Materials I exposed the pUC19 to some of the highest natural UV radiation levels in the world, a Kenyan summer. Before I went to Kenya, I exposed the pUC19 to UV in a sterilization hood to see if it would nick or break. The pUC19 under the UV hood nicked and broke. I then exposed five quartz cuvettes containing the pUC19 to the Kenyan solar radiation for a full day on January 4, 2007 and repeated it again on January 7, 2007. Back in California, I ran three controls (lab bench, frozen, and exposed to airport x-ray scanners) and the 10 samples in a 1.2% agarose gel.</p> <p>Results The control test in the gremecidal UV hood showed some nicking after one hour of exposure. In the feild tests the results proved there was nicking and breaking of the pUC19 in the 10 samples, while the controls remained super-coiled. On a cloudy day the results proved that there was nicking, but on a sunny day there was nicking and breaking.</p> <p>Conclusions/Discussion My results proved there was nicking and breaking of the pUC19 in the 10 samples, while the controls remained super-coiled. I conclude from the results that the natural levels of UV on the earth are high enough to damage super-coiled DNA.</p>	
Summary Statement I determined if an engineered super-coiled DNA plasmid (pUC19) could stay intact under natural levels of UV radiation.	
Help Received Dana Rogoff isolated the plasmid, and helped me in the use of the equipment. Kevin Hand assisted me with the light readings, and Lynn Rothschild provided me with the opportunity to conduct this experiment.	